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(12) # EUROPEAN PATENT SPECIFICATION

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(54) **A breathing device including a holder and a regenerative heat-moisture exchanger.**

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(73) Proprietor: **GIBECK RESPIRATION AB**
Box 711
S-194 27 Upplands Väsby (SE)

(72) Inventor: **Lambert, Hans**
Lilljans Plan 5
S-114 25 Stockholm (SE)

(74) Representative: **Westerlund, Christer et al**
L.A. Groth & Co Patentbyra AB,
P.O. Box 6107
S-102 32 Stockholm (SE)

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Description

Technical field

The present invention relates to a breathing device for tracheotomy patients. The device comprises a holder detachably connected to the stoma in the patient's throat and has additional features as described in the preamble of claim 1.

Background art

The need for warming and moisturizing the inspiration air in connection with the upper air passages being cut off in as a result of tracheotomy is well known and several devices intended to fill this need have been proposed.

A known device of the above-mentioned kind is disclosed in SE-B 348 643 wherein a holder is detachably mounted to the cannula, the holder holding detachably a tube in which a regenerative heat-moisture exchanger body is disposed.

A disadvantage of the device according to the above-mentioned publication is that the device protrudes quite a bit from the patient's throat, which particularly to active people carrying the device poses a problem with respect to the risk of their accidentally touching the device, which might then be displaced or cause pain in the patient's throat, as well from the aesthetic point of view. Further disadvantages are the relatively complicated structure of the device and the insufficient tightness between the holder and the heat-moisture exchanger body.

A further example of a known device of the abovementioned kind is disclosed in SE-B 385 767 wherein a bandage containing, among others, a heat-moisture exchanger filter is applied directly around the stoma made in the patient's throat.

A disadvantage of the last-mentioned device is that the bandage must be detached from the patient's throat every time the filter has to be changed, which sometimes has to be done several times a day. The change causes discomfort and often strain and harm to the skin, expecially if this has previously been subject to radiation treatment. Furthermore, on each change not only the filter but also other parts of the bandage must be discarded, which is uneconomical.

US-A-4 763 645 discloses a filter device including a filter holder enclosing a filter. The holder is inserted into or snapped onto the outer end of an existing tracheal tube. An end cap is detachably mounted on the holder or integrally formed with the holder.

This filter device can only be used in connection with an existing tracheal tube but not with a stoma in the throat. Further, the location of the holder within the tube makes access to the holder and filter difficult. This is a severe disadvantage because the patient wearing the filter device very often needs to remove the holder and exchange the filter therein, for instance in connection with an attack of coughing blocking the air passage through the filter. In addition to this, the filter device does not include a heat-moisture exchanger.

DE-A- 22 23 474 refers to a heat-moisture exchanger which is connected to a tracheal tube and not to a stoma. There is no holder between the exchanger and the tube and the distance between the openings of the exchanger is longer than the extension of the holder perpendicularly thereto.

Description of the invention

It is an object of the present invention to eliminate the disadvantages of previously known devices of the above-mentioned kind and to provide a device which protrudes only a short distance from the patient's throat, is of simple construction, provides effective sealing between the patient's throat and the heat-moisture exchange, and allows the heat-moisture exchanger to be replaced without discomfort or harm to the patient and also without parts of the device other than the heat-moisture exchanger having to be discarded.

This object is achieved by the device according to the invention having been given the features stated in the characterizing portions of the claims.

Description of the figures

Figure 1 is a perspective view of a first embodiment of the device according to the invention;
Figure 2 is a sectional view of a second embodiment of the device according to the invention; and
Figure 3 is a sectional view of a third embodiment of the device according to the invention.

Preferred embodiments

The breathing device shown in Figures 1 and 2 comprises a conventional tracheal cannula intended to be inserted through the stoma in the patient's throat for communication with the patient's windpipe, whereas the breating device of Figure 3 does not present such a cannula and is intended to be located over said stoma in the throat.

The tracheal cannula depicted in Figure 1 is provided with an outer end which is formed as a slightly conical tube surrounded by a flange 1a. A holder 2 in the form of a funnel-shaped, air-proof receptacle has a slightly conical connection piece 2a which is insertable into the outer end of the cannula 1 into which it fits. Opposite the connection

piece 2a the holder is provided with an oppening 2b which is wider than the opening 2a of thene connection pieces flexible holding means in thene form of two claws 3 being attached to the edgges of the opening 2b. The claws are integral with tl the holder 2 which is suitably made of a transpareient plastic material.

A regenerative heat-moisture excharanger 4 is detachably mounted to the holder 2. T The heat-moisture exchanger 4 comprises a ca:ap-shaped plastic cover 5 containing a cylindrical, l, flat filter body 6 made up of helically wound stripips of corrugated mini cardboard suitably impregnatated with a hygroscopical material for good heat and d moisture absorption from the expiration air and g good heat and moisture emission to the inspirationn air. The channels formed between the layers of cicorrugated cardboard run parallel to the central connelecting line between the openings 2a and 2b. Instead ɔ of wound strips, the filter body 6 can be made up ɔ of cotton wool, foamed plastic or the like with subbstantially the same properties as the wound strips. l. In relation to its diameter, the filter body 6 has a lolow height. The filter body 6 suitably has a diameter c of 24 mm and a height of 8 mm.

The heat-moisture exchanger 4 is atttattached to the holder 2 in one simple operation by y pressing the cover 5 against the claws 3, which wiwill then be displaced radially outwards and will snapp over the flange 5a of the cover such that the l latter will sealingly engage with the edges of the opopening 2b. The heat-moisture exchanger 4 is removeved in one simple operation by pulling it away from tl the holder 2, the claws 3 springing outwards thereby y releasing the flange 5a.

Figure 2 shows a tracheal cannula 11 1 the outer end of which is formed as a slightly corpnical tube 11b with a flange 11a attached to it. A hololder 12 in the form of a funnel-shaped air-proof recceptacle is provided with a slightly conical connectiction piece 12a, which fits onto the tube 11b of the caannula 11. On the holder 12, opposite the connectiction piece 12a, there is an opening 12b which is wwider than the opening of the connection piece 12a, t the edges of the opening 12b being perpendiculalar to the longitudinal axis of the connection piece 1:12a.

A regenerative heat-moisture exchanger 14 is attached to the holder 12 and is identicical to the heat-moisture exchanger 4 shown in figuure 1. The exchanger 14 is detachably mounted to tl the holder 12 by adhesive means 13 between the ɔ edges of the opening 12b and the flange 14a olof the exchanger 14. The adhesive means 13 can c consist of, for example a suitable glue or double ɔ adhesive tape.

Figure 2 is a diagrammatical view of a a conventional speech valve 15 detachably mountnted to the end of the exchanger 14 turned away from the holder 12. Alternatively, such a speech valve could be mounted to the heat-moisture exchanger of the devices according to the other embodiments.

Figure 3 shows a holder 22 in the form of a funnel-shaped air-proof receptacle, said holder being provided with an opening surrounded by a circular flange 22a and a wider opening 22b opposite the first-mentioned opening and surrounded by edges parallell with the flange 22a.

A regenerative heat-moisture exchanger 24 is mounted to the holder 22 and identical to the heat-moisture exchangers 4 and 14 shown in Figures 1 and 2. The exchanger 24 is detachably mounted to the holder 12 by means of claws 23 which are identical to the claws 3 of Figure 1, as shown in Figure 3, or by adhesive means of the kind shown and described above in connection with Figure 2.

At the end of the flange 22a turned away from the exchanger 24 there is attached an annular double adhesive tape 25. On removal of a protective sheet from the end of the tape 25 turned away from the exchanger 24, the device is attached in accordance with Figure 3 around the stoma made in the patient's throat to the windpipe such that the central opening of the annular tape 25 will be right opposite the stoma in the throat and such that the tape will adhere around the stoma in the throat. Instead of the tape 25 it is possible to appiy adhesive means of other suitable kind to the flange 22a.

In the devices described above and depicted in the figures, the devices protrude a comparatively short distance from the throat of the person carrying the same. On the holders 2, 12 and 22 there is, on each of them, a short distance between the two openings of the holder which is shorter than the extension of the holder perpendicularly thereto and is suitably less than the thickness of the exchangers 4, 14 and 24 respectively. For all three holders 2, 12 and 22 identical heat-moisture exchangers 4, 14 and 24 are used, which provides flexibility in use as well as cost savings.

Although some embodiments of the device according to the invention have been described above and shown on the drawings, it should be understood that the invention is not limited to said embodiments but only by the statements of the claims.

Claims

1. A breathing device for tracheotomy patients, comprising a holder detachably connectable to a stoma in the patient's throat, the holder (2;12;22) holding a regenerative heat-moisture exchanger (4;14;24) and being an air-proof receptacle having a first opening (2a;12a;22a) detachably connectable to and then commu-

nicating with the stoma in the throat t and a second opening (2b;12b;22b) situated oppposite the first opening and projecting outwardldly from said stoma, the heat-moisture exclchanger (4;14;24), which is provided with a filteer body (6;16), sealingly and detachably engagiging the edges of the second opening, **characcterized in** that the distance between the first o opening (2a;12a;22a) and the second o opening (2b;12b;22b) is shorter than the extensnsion of the holder (2;12;22) perpendicularly thereereto.

2. A breathing device according to claim 1,1, **characterized in** that the filter body (6;16)3) is flat and preferably cylindrical, having passagageways for breathing air flowing towards and frcrom the filter body substantially in parallel with ı a connecting line between the two openings (2(2a;12a; 22a; 2b;12b;22b).

3. A breathing device according to claim 1 or 2, **characterized in** that the receptacle (2;2;12;22) is funnel-shaped, the two openings c of said receptacle being circular and the seconcd opening (2b;12b;22b) being wider than thhe first opening (2a;12a;22a).

4. A breathing device according to any / of the preceding claims, **characterized in** thhat the detachable connection between the filteer body (6;16) and the edges of the second o opening (2b;12b;22b) comprises resilient holding ȝ means (3;23) attached to said edges or an acdhesive means (13).

5. A breathing device according to any / of the preceding claims, **characterized in** thhat the detachable connection between the stctoma in the throat and the holder (22) is an acdhesive means (25).

6. A breathing device according to any / of the preceding claims, **characterized in** that a speech valve (15) is detachably mourunted to the heat-moisture exchanger (4;14; 24)) on the side of the same which is turned awa:ay from the holder (2;12;22).

7. A breathing device according to any / of the preceding claims, **characterized in** thhat the distance between the stoma in the throoat and the filter body (6;16) is less than or sisubstantially equal to the thickness of the latter.

Patentansprüche

1. Beatmungsvorrichtung für Patienten mimit Luftröhrenschnitt umfassend einen Halter, dder lösbar mit einem Atmungsloch im Hals des Patienten verbindbar ist, welcher Halter (2; 12; 22) einen regenerativen Wärme-Feuchtigkeitsaustauscher (4; 14; 24) beinhaltet, und als luftdichter Behälter ausgebildet ist, der eine erste Öffnung (2a; 12a; 22a), die mit dem Atmungsloch im Hals lösbar verbindbar ist und dann mit diesem in Verbindung steht, sowie eine zweite Öffnung (2b; 12b; 22b) aufweist, die an der zur ersten Öffnung entgegengesetzten Seite liegt und vom genannten Atmungsloch nach außen vorragt, wobei der mit einem Filterkörper (6; 16) versehene Wärme-Feuchtigkeitsaustauscher (4; 14; 24) dicht und lösbar in die Ränder der zweiten Öffnung eingreift, dadurch gekennzeichnet, daß der Abstand zwischen der ersten Öffnung (2a; 12a; 22a) und der zweiten Öffnung (2b; 12b; 22b) kleiner ist als das Ausmaß des Halters (2; 12; 22) senkrecht dazu.

2. Beatmungsvorrichtung nach Patentanspruch 1, dadurch gekennzeichnet, daß der Filterkörper (6; 16) flach und vorzugsweise zylindrisch ist sowie Durchgänge für die Atemluft aufweist, die zum und vom Filterkörper im wesentlichen parallel zu einer Verbindungsleitung zwischen den zwei öffnungen (2a; 12a; 22a; 2b; 12b; 22b) strömt.

3. Beatmungsvorrichtung nach Patentanspruch 1 oder 2, dadurch gekennzeichnet, daß der Behälter (2; 12; 22) trichterförmig ist, wobei die beiden Öffnungen des Behälters kreisförmig sind und die zweite Öffnung (2b; 12b; 22b) größer als die erste Öffnung (2a; 12a; 22a) ist.

4. Beatmungsvorrichtung nach einem der vorhergehenden Patentansprüche, dadurch gekennzeichnet, daß die lösbare Verbindung zwischen dem Filterkörper (6; 16) und den Rändern der zweiten Öffnung (2b; 12b; 22b) federnde an den Rändern angebrachte Halteorgane (3; 23) oder ein Klebemittel (13) umfaßt.

5. Beatmungsvorrichtung nach einem der vorhergehenden Patentansprüche, dadurch gekennzeichnet, daß die lösbare Verbindung zwischen dem Atmungsloch im Hals und dem Kalter (22) ein Klebemittel (25) ist.

6. Beatmungsvorrichtung nach einem der vorhergehenden Patentansprüche, dadurch gekennzeichnet, daß auf der vom Halter (2; 12; 22) abgewendeten Seite des Wärme-Feuchtigskeitsaustauschers(4; 14; 24) ein Sprechventil (15) lösbar angebracht ist.

7. Beatmungsvorrichtung nach einem der vorhergehenden Patentansprüche, dadurch gekennzeichnet, daß der Abstand zwischen dem Atmungsloch im Hals und dem Filterkörper (6; 16) kleiner als oder im wesentlichen gleich der Dicke des letzteren ist.

Revendications

1. Dispositif respiratoire pour des patients trachéotomisés, comprenant un support se raccordant de manière détachable à une ouverture dans la gorge du patient, le support (2; 12; 22) portant un échangeur de chaleur et d'humidité régénérateur (4; 14; 24) et se présentant comme un réceptacle étanche à l'air ayant une première ouverture (2a; 12a; 22a) sise raccordant de manière détachable à, et communicant alors avec, l'ouverture dans la gorge, et une deuxième ouverture (2b; 12b; 22b)) située à l'opposé de la première ouverture et saillant vers l'extérieur de ladite ouverture dans la gorge, l'échangeur de chaleur et d'humidité (4; 14; 24), qui est muni d'un corps de filtre (6; 16), s'engageant de manière étanche et détachable avec les bords de la deuxième ouverture, caractérisé en ce que la distance entre la première ouverture (2a; 12a; 22a) et la deuxième ouverture (2b; 12b; 22b) est plus courte que l'extension du support (2; 12; 22) perpendiculairement à celle-ci.

2. Dispositif respiratoire selon la revendication 1, caractérisé en ce que le corps de filtre (6; 16) est plat et de préférence cylindrique, ayant des passages pour que de l'air de respiration s'écoule vers et depuis le corps de filtre substantiellement en parallèle avec un conduit de liaison entre les deux ouvertures (2a; 12a; 22a; 2b; 12b; 22b).

3. Dispositif respiratoire selon la revendication 1 ou 2, caractérisé en ce que le réceptacle (2; 12; 22) a une forme d'entonnoir, les deux ouvertures dudit réceptacle étant circulaires et la deuxième ouverture (2b; 12b; 22b) étant plus large que la première ouverture (2a; 12a; 22a).

4. Dispositif respiratoire selon l'une quelconque des revendications précédentes, caractérisé en ce que le raccord détachable entre le corps de filtre (6; 16) et les bords de la deuxième ouverture (2b; 12b; 22b) comprend des moyens de maintien élastiques (3, 23) fixés auxdits bords, ou un moyen adhésif (13).

5. Dispositif respiratoire selon l'une quelconque des revendications précédentes, caractérisé en ce que le raccord détachable entre l'ouverture dans la gorge et le support (22) est un moyen adhésif (25).

6. Dispositif respiratoire selon l'une quelconque des revendications précédentes, caractérisé en ce qu'une soupape de parole (15) est montée de manière détachable sur l'échangeur de chaleur et d'humidité (4; 14; 24) sur le côté de celui-ci qui est opposé au support (2; 12; 22).

7. Dispositif respiratoire selon l'une quelconque des revendications précédentes, caractérisé en ce que la distance entre l'ouverture dans la gorge et le corps de filtre (6; 16) est inférieure à ou substantiellement égale à l'épaisseur de ce dernier.

Fig. 1

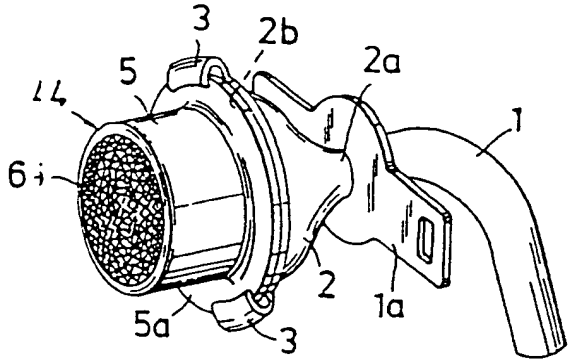

Fig. 2

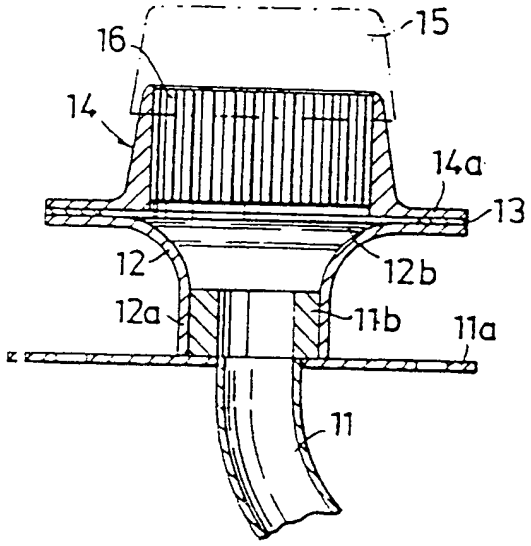

Fig. 3